

VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE SPECIFICATION:

Specification at page 5, line 8:

The substrate of the invention is [suitably] suitable for use in the preparation of a composite membrane for use in a fuel cell. When for use in a fuel cell, the total thickness of the membrane is less than 200µm and preferably less than 100µm.

Specification at page 6, line 18:

2. Perfluorinated or partially-fluorinated polymers further having aromatic rings, such as those described in PCT patent specifications numbers WO 95/08581[, WO 95/08581] and WO 97/25369, which have been functionalised with SO₃H, PO₂H₂, PO₃H₂, CH₂PO₃H₂, COOH, OSO₃H, OPO₂H₂, and/or OPO₃H₂. Also included are radiation- or chemically-grafted perfluorinated polymers, in which the perfluorinated carbon chain is activated by radiation or chemical initiation in the presence of a monomer, such as styrene, which can be functionalised to contain an ion-exchange group. Suitable perfluorinated polymers include, for example, PTFE, fluorinated ethylene-propylene (FEP), tetrafluoroethylene-ethylene (ETFE) copolymers, tetrafluoroethylene-perfluoroalkoxy (PFA) copolymers, poly(vinyl fluoride) (PVF) and poly(vinylidene fluoride) (PVDF).

IN THE CLAIMS:

- 1 3. (Amended) A substrate according to claim 1 [or claim 2],
2 wherein the fluorinated hydrocarbon polymer comprises one or more non-ion-
3 conducting polymer(s).
- 1 4. (Amended) A substrate according to [any preceding] claim 3,
2 wherein the non-ion-conducting polymer is selected from the group consisting of
3 polytetrafluoroethylene (PTFE), fluorinated ethylene-propylene (FEP),

4 tetrafluorethylene-ethylene (ETFE) copolymers, poly(vinylfluoride) (PVF) and
5 poly(vinylidene fluoride) (PVDF).

1 5. (Amended) A substrate according to [any preceding] claim 1,
2 [which] wherein the silica comprises a colloidal silica[:PTFE mixed binder] and the
3 polymer comprises PTFE.

1 6. (Amended) A substrate according to [any preceding] claim 1,
2 wherein the ratio of silica to polymer is in the range of from 95:5 % to 5:95 % based
3 on w/w solid materials in the binder mixture.

1 8. (Amended) A substrate according to [claim 6 or] claim 7
2 wherein the ratio of silica to polymer is about 50:50 %, based on w/w solid
3 materials in the binder mixture.

1 9. (Amended) A substrate according to [any preceding] claim 1,
2 wherein the mixed binder is in the form of a dilute aqueous dispersion.

1 10. (Amended) A substrate according to claim 9 wherein the
2 [mixed binder is in the form of a] dilute aqueous dispersion [of] has about 10wt %
3 solids in the aqueous solution.

1 11. (Amended) A substrate according to [any preceding] claim 1,
2 wherein the fibres [comprises] comprise at least one of glass [and/or] or silica.

1 12. (Amended) A substrate according to [any preceding] claim 1,
2 wherein the fibres have a diameter in the range of from 0.1µm to 50µm.

1 14. (Amended) A membrane according to claim 13 which, when
2 [tested by the method described herein in the Examples, results in] dried then
3 boiled in water undergoes less than or equal to about ±16 % change in its area[;
4 preferably, ≤±10 % area change; more preferably, in the range of from about 0 to
5 about 6 % expansion].

1 15. (Amended) A process for preparing a porous substrate
2 according to [any one of claims] claim 1 [to 12], which process comprises applying
3 an aqueous dispersion of silica and a fluorinated hydrocarbon polymer to a porous
4 matrix of wet fibres.

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T09140-559/0860

- 1 16. (Amended) A process for the manufacture of a substrate
2 [according to any one of claims 1 to 12], [which process comprises] comprising the
3 steps of
- 4 (a) dispersing [the] fibres in water to form a slurry;
5 (b) depositing the slurry onto a mesh bed to form a fibre
6 network;
7 (c) drying and compacting the fibre network; and
8 (d) applying, before or after step (c), a dispersion of [the] a
9 binder comprising both silica and a fluorinated hydrocarbon
10 polymer.
- 1 17. (Amended) A process for the manufacture of a membrane
2 [according to claim 13 or claim 14], [which process comprises] comprising the
3 steps of
- 4 (i) forming a porous substrate [of, preferably randomly
5 orientated individual, mixed amorphous silica fibres bound
6 with a binder by a process] according to claim 16; and,
7 thereafter,
8 (ii) impregnating the fibre matrix substrate with a polymeric
9 material to produce a membrane.
- 1 19. (Amended) A membrane electrode assembly comprising [a
2 substrate according to any one of claims 1 to 12 and/or] a composite membrane
3 according to claim 13 [or claim 14].
- 1 20. (Amended) A fuel cell comprising [a substrate according to
2 any one of claims 1 to 12 and/or] a composite membrane according to claim 13 [or
3 claim 14].

Claims 21-23 have been added.

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